

REMARKS

Claims 1 to 28 and 30 – 72 are pending in this application. Claims 1, 3-5, 12-14, 18, 19, 21 and 24-27 are amended herein. Claim 29 has been canceled.

The Objection to the Claims

Claim 3, 12, 18 and 24 are objected to for being inconsistent with Claims 2, 11, 17 and 23, respectively, from which they depend, insofar as the definition of R⁴¹ is restricted to C₂–C₃₀ hydrocarbons in Claims 2, 11, 17 and 23 but is defined as a C₁–C₃₀ hydrocarbon group in Claims 3, 12, 18 and 24. This objection is cured by amending the claims to change dependency respectively to Claims 1, 9, 15 and 22. Claims 3, 12, 18 and 24 further limit the subject matter of the preceding claims, wherein R⁴⁰ and R⁴¹ can be the same *or* different, by defining R⁴⁰ and R⁴¹ as different groups.

Claims 4, 5, 13, 14, 19, 20, 25, 26 and 28 are objected to. The Office Action states that it is not clear how cyclopentyl, cyclopentadienyl and cyclohexyl fall under the general description of “an alkyl group of from about 2 to about 30 carbon atoms.” Claims 4, 5, 13, 14, 19, 21, 25 and 26 are amended to delete reference to cyclopentadienyl. Applicants respectfully submit that the term “alkyl” includes both straight or branched chain alkyl and cyclic alkyl. Claim 1 is amended to more explicitly refer to cyclic alkyl as well as non-cyclic alkyl.

Claim 25 is objected to for improperly including reference to n-butyl. This error is corrected by amending Claim 25 herein to delete reference to n-butyl.

Claim 28 is objected to for reciting species not appearing in the preceding Claim 27. This informality is cured by adding di(cyclopentyl) silanediyl and cyclohexyla(methyl)silanediyl to Claim 27. Reconsideration and withdrawal of the objections are respectfully requested.

The Rejection of the Claims

1. Claims 1, 2, and 6-8 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,184,402 ("Yamazaki et al."). This rejection is respectfully traversed.

The Examiner's attention is drawn to the fact that the mixture of racemic and meso isomers of the product of the present invention has a weight ratio of racemic to meso isomers of greater than 5:1 as synthesized. See, the last two lines of Claim 1. The term "as synthesized" means that the synthesized product has not undergone any further processing (such as solvent extraction, fractional crystallization, etc.) to have the recited higher rac/meso weight ratio. See, for example, page 32 of the specification, lines 4-11 wherein the meaning of the term "as synthesized" is given. Referring now to the specification at page 4, lines 3-21, the disadvantages of the prior known methods are discussed.

The organometallic by-products are usually separated in a second step, in which the crude product is dissolved in a solvent and then depleted of undesired organometallic by-products, e.g., isomers, by fractional crystallization or fractional precipitation. The disadvantage of these methods is that many metallocenes are only moderately soluble in common organic solvents and therefore require large amounts of solvent, large filtration equipment, and a great deal of time. In addition, large amounts of solvents that are toxic or environmentally controversial are often used. Since the inorganic by-products are often obtained in very fine distribution, filtration times can become very long, even if filter aids are added and the filtration is carried out at elevated pressure. To be able to isolate the metallocene as completely as possible from the filtrate, it is usually necessary to distil off the solvent. This presents the problem of the limited stability of these types of metallocene solutions towards impurities, such as traces of moisture, bases, protic compounds, and thermal stress. Another point is that the large number of reaction steps makes it quite uneconomical in some cases. This problem is exacerbated by the fact that the compounds formed in the individual purification steps, some of which contain educts, cannot be isolated, since they are poorly separable components in mixtures.

In contrast to this, a significant feature of the present invention is that the process provides a composition having a weight ratio of racemic to meso isomers of greater than 5:1 *as synthesized*.

Referring now to the Yamzaki et al. reference, the “as synthesized” exemplified compositions have rac/meso ratios of 50/50 (Examples 1, 2, 5, 6), 40/60 (Examples 3,4) , and 77/23 (Example 7). Referring particularly now to Example 3 (Col. 22) of Yamazaki et al. by way of illustration, a separate step for separating the racemic isomer was needed to obtain a rac/meso ratio of 93/7. However, the yield was only 5%. The advantage of the present invention is that high yields are obtained *without* an additional purification step.

Yamazaki et al. neither discloses nor suggests Applicants’ claimed invention. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

2. Claims 4, 9-11, 13, 15, 27 and 28 are rejected under 35 U.S.C. §103(a) as being obvious over Yamazaki et al. These claims depend directly or indirectly from Claim 1, which is submitted to be allowable for the reasons stated above. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

3. Claim 29 is rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,960,676 (“Rix et al.”).

Claim 29 has been canceled. Accordingly, this rejection no longer obtains.

4. Claims 1, 2, 4, 6-9, 11, 13, 15, 17, 19, 20, 30 – 42 and 53-71 are rejected under 35 U.S.C. §103(a) as being obvious over Rix et al. This rejection is respectfully traversed.

At paragraph 11, the Office Action states in relevant part:

The reference is silent regarding the *rac/meso* ration for all combinations of metallocene, however in view of the fact that process steps of the prior art are essentially the same as those recited in the instant claims, and in light of the fact that the example shows formation of predominantly racemic stereoisomer, a reasonable basis exists to believe that the process of Rix et al. affords essentially the same mixture of metallocene product.

Applicants respectfully disagree with the above statement.

The steps of the current process are significantly different from those of Rix et al. *Every* example of Rix et al. requires fractional crystallization, whereas no such step is performed in the process of the present invention. Applicants achieve a mixture of racemic and meso isomers having a rac/meso isomers having a rac/meso weight ratio above 5/1 *as synthesized*. The only way for Rix et al. to achieve a proper rac/meso ratio is with an extra purification step with a concomitant loss in yield.

By way of illustration of the differences between the method of the invention and that of Rix et al., reference is made to Examples 2 and 4 of the present invention. In simplified form, the present invention as exemplified in Examples 2 and 4 involves:

1. Addition of the indene compound, either and organo lithium at room temperature;
2. Overnight stirring;
3. Cooling to 0°;
4. Addition of zirconium tetrachloride;
5. Addition of more ether;
6. Warming to room temperature with stirring;
7. Recovery of precipitate.

In contrast to this, the Rix et al. method employs the following steps for the preparation of metallocene A and B (Rix et al., col. 30):

1. Mixing of indene compound with toluene and trimethyltin chloride;
2. Stirring for 2 hours;
3. Filtration onto a slurry of hafnium tetrachloride;
4. Rinsing with toluene, stirring overnight;
5. Drying in vacuo at 50°C and rinsing with pentane;
6. Fractional crystallization with cooling to -30°C.

The time and degree of cooling are significantly different in the present invention and the Rix et al. method. Moreover, Rix et al. requires a crystallization step at -30°C whereas Applicants' process recovers the product at room temperature as synthesized without a purification step to improve the rac/meso ratio.

Rix et al. neither discloses nor suggests a process wherein a product mixture of racemic and meso metallocene isomers is produced having a rac/meso ratio of greater than 5/1 *as synthesized*. Reconsideration and withdrawal of the rejection are respectfully requested.

5. Claims 1, 2, 4, 6-9, 29, 30-32, 34-36, 40, 41, 53-55 and 62-70 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,945,367 ("Thiele et al."). This rejection is respectfully traversed.

Thiele et al. requires fractional crystallization to obtain a rac/meso ration of 20 (see Example IV at col. 10, lines 41-52), and therefore the product is not "as synthesized" as required by independent Claims 1, 30 and 34. Accordingly Thiele et al. does not disclose or suggest the invention as claimed. Reconsideration and withdrawal of the rejection are respectfully requested.

6. Claim 29 is rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,985,576 ("Rohrmann et al."). Claim 29 is cancelled herein. Accordingly, this rejection no longer obtains.

7. Claims 1, 2, 4, 6-8, 34-42 and 53-68 are rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,365,763 ("Winter et al."). This rejection is respectfully traversed.

Winter et al. teaches a way to make *unsubstituted* indenyl metallocenes with *dimethyl* silane bridges. However, the present invention is directed to substituted indenyl compounds wherein the R⁴⁰ and R⁴¹ groups of the bridging member R⁹ cannot be two methyl groups. Nor is there any evidence that the Winter et al. method can achieve a rac/meso ratio of 5/1 or greater with substituted indenyl groups.

Referring now to Comparative Example 23 of the present invention, it can be seen that preparation of the substituted indenyl metallocene dimethylsilanediyl bis (2-methyl-4-(4'-tert-butyl-phenyl) indenyl zirconium chloride provided a compound with a rac/meso ratio of 1:1. In contrast to this, Example 22 illustrates the production of n-hexyl(methyl) silanediyl bis (2-methyl-4-(4'-tert-butyl-phenyl) indenyl) zirconium chloride according to the invention wherein the rac:meso ratio achieved was greater than 15:1. Accordingly, not only is there no suggestion in Winter et al. to perform the process of Applicants' claims, but also, the Winter et al. process would not produce results equivalent to those achieved with the claimed metallocenes. Reconsideration and withdrawal of the rejection are respectfully requested.

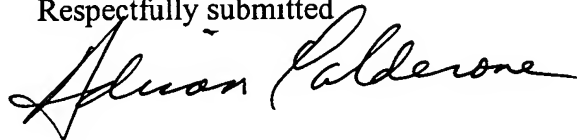
Allowable Subject Matter

Allowability of the subject matter of Claims 3, 5, 12, 14, 16 18, 21-26, 43-52 and 72 is gratefully acknowledged.

CONCLUSION

For at least the reasons stated above all of the pending claims are submitted to be in condition for allowance, the same being respectfully requested.

Respectfully submitted

A handwritten signature in black ink, appearing to read "Adrian Calderone", written in a cursive style.

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